

SUBSTITUTE SPECIFICATION

IMAGE DISPLAY METHOD AND IMAGE DISPLAY APPARATUS

BACKGROUND OF THE INVENTION

The present invention relates to an image display apparatus. More particularly, the invention relates to means for arbitrarily switching display resolution and rewriting speed of an image within a display screen.

In recent years, progress has been made in the reduction of the thickness and weight of an image display apparatus. In place of the CRT which has been primarily used as an image display device, a flat panel display, such as a liquid crystal display, PDP (Plasma Display Panel), and ELD (Electroluminescent Display) has experienced widespread use. On the other hand, the development of new technology, such as the design of a FED (Field Emission Display) and so forth, has also received much attention. Furthermore, as a result of the widespread use of the personal computer, DVD, digital broadcasting and so forth, the provision of a display having a high definition and high gradation or multi-level gradation has becomes essential. The demand for higher performance, particularly a higher definition level of the image display apparatus, is expected to be grow in the future.

However, in a current display method for display of an image or a current driving system for use in an image display apparatus, it is becoming difficult to cope with the increase in the display frequency associated with the increased density

of the display due to signal delay on the line, lack of a sufficient writing period to respective pixels and an increase in the scanning frequency.

On the other hand, degradation of the image quality when a dynamic image is displayed in a hold illumination type image display apparatus, such as liquid crystal display, has been reported in Institute of Telecommunications Engineers Technical Report EID 96-4, pp. 19 - 26 (June, 1996).

According to this report, due to mismatching of a dynamic image in hold illumination and the radial motion of the human eye when following a dynamic image, bluing of the dynamic image can be caused so as to lower the image quality of the dynamic image display. In order to avoid such lowering of image quality of the dynamic image display, a method of multiplying a frame frequency by n times and other methods have been disclosed.

A method of multiplying the frame frequency by n times, for clearly displaying a dynamic image on a hold illumination type image display apparatus, such as a liquid crystal display, is a method of increasing the display frequency. However, as set forth above, in the current method of display of an image or the driving system used in the image display apparatus, the increasing of the display frequency is becoming close to the limit.

In the future, in order to adapt to increases in high density display and dynamic image display, a study has been made for a new material for a dynamic display and for reducing

the line resistance and line capacity as a factor for signal delay on the line.

On the other hand, in order to improve the writing capacity for a pixel, a thin film transistor (TFT) using polycrystalline silicon has been recently commercialized as a replacement of the conventional TFT using amorphous silicon.

Furthermore, Japanese Patent Application Laid-open No. 8-006526 (1996) discloses a liquid crystal image display apparatus using means for switching between single line selection and multiple line simultaneous selection for varying the resolution.

However, in this technology, the resolution is constant on the line. Furthermore, nothing has been mentioned in connection with a method capable of achieving both high definition and high speed display.

Furthermore, Japanese Patent Application Laid-Open No. 9-329807(1997) discloses a liquid crystal image display apparatus which has block selection means for lowering the power consumption and rewriting only a rewritten image per block. However, for dynamic image display, in which the entire screen image is rewritten, a high speed dynamic image display is difficult due to signal delay and a limitation on the writing performance.

In order to reduce signal delay on the line and enhance the writing performance, it is essential to develop a material and/or a process which will produce such benefits. However, there are lots of problems to be solved, such as reliability,

stability, uniformity and so forth. Therefore, it is estimated that it will require a long development period to obtain a satisfactory product.

Therefore, a displaying method or driving method capable 5 of high definition display and dynamic image display with increased demand, must be developed using currently available material and an active element, such as TFT, MIM and so forth.

According to a study of human visual characteristics, for 10 dynamic image display, sufficient image quality can be perceived even with not so high a definition, since the image is rewritten at high speed. On the other hand, for still image display, while it is not necessary to rewrite the image at high speed, for perception of sufficient image quality, a high definition display is required.

15 SUMMARY OF THE INVENTION

It is a first object of the present invention to provide a display method which can achieve both a substantially high definition image display and high speed dynamic image display by eliminating information of lower recognition level 20 utilizing visual characteristics for still image display and dynamic image display.

It is a second object of the present invention to provide an image display apparatus which is capable of arbitrarily switching between a region for lowering definition of a 25 dynamic image and displaying with rewriting at high speed, and a region of high definition display of a still image when rewriting at low speed.